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| (51) International Patent Classification ⁷ : H04N 9/804, 5/783 // H04N 5/7826 | A3 | (11) International Publication Number: WO 99/65239 (43) International Publication Date: 16 December 1999 (16.12.99) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (21) International Application Number: PCT/IB99/01015 (22) International Filing Date: 3 June 1999 (03.06.99) (30) Priority Data: 98201959.8 11 June 1998 (11.06.98) EP (71) Applicant: KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL). | (81) Designated States: AU, BR, CN, JP, KR, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 9 March 2000 (09.03.00) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (71) Applicant (for SE only): PHILIPS AB [SE/SE]; Kottbygatan 7, Kista, S-164 85 Stockholm (SE). (72) Inventors: EERENBERG, Onno; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). RIJCKAERT, Albert, M., A.; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). BRÜLS, Wilhelmus, H., A.; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). (74) Agent: VAN DER KRUK, Willem, L.; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (54) Title: TRICK PLAY SIGNAL GENERATION FOR A DIGITAL VIDEO RECORDER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (57) Abstract <p>The invention relates to the generation of a trick play information stream from a normal play information stream, so that they can be recorded together as a composite information stream on the record carrier, such that upon reproduction in a trick play reproduction mode, an information signal of sufficient quality, e.g. as regards visibility, can be obtained. One aspect of the invention lies in the generation of GOPs, each GOP comprising an I-frame retrieved from the original normal play information stream, and one or more so-called "empty P frames". Another aspect of the invention is the requirement of generating GOPs for the trick play information stream that have a constant bitcost per GOP. Again another aspect of the invention lies in the retrieval of the I-frame for the trick play information stream from the normal play information. More specifically, an I-frame is generated by retrieving from an I-frame included in the normal play information, the DC coefficient of the I-frame and a number of AC coefficients from that I-frame and generate the I-frame for the trick play information stream therefrom. More specifically, the number of AC coefficients for an I-frame of the trick play information signal depends on the difference between the DC coefficients of two subsequent I-frames in the normal play information from which the I-frame to be generated and the just previously generated I-frame for the trick play information signal have been derived.</p> <div style="text-align: center; margin-top: 20px;"> <p>Trick play speed + 4</p> <table border="1" style="margin: auto;"> <tr> <td>I</td><td>P</td><td>P</td> <td>I</td><td>P</td><td>P</td> <td>I</td><td>P</td><td>P</td> <td>I</td><td>P</td><td>P</td> <td>I</td><td>P</td><td>P</td> <td>I</td> </tr> </table> <p>↓</p> <p>Trick play speed + 12</p> <table border="1" style="margin: auto;"> <tr> <td>I</td><td>P</td><td>P</td> <td>I</td><td>P</td><td>P</td> <td>I</td><td>P</td><td>P</td> <td>I</td><td>P</td><td>P</td> <td>I</td><td>P</td><td>P</td> <td>I</td> </tr> </table> <p>↓</p> <p>Trick play speed + 24</p> <table border="1" style="margin: auto;"> <tr> <td>I</td><td>P</td><td>P</td> <td>I</td><td>P</td><td>P</td> <td>I</td><td>P</td><td>P</td> <td>I</td><td>P</td><td>P</td> <td>I</td><td>P</td><td>P</td> <td>I</td> </tr> </table> <p style="text-align: right;">Time →</p> </div> | | | I | P | P | I | P | P | I | P | P | I | P | P | I | P | P | I | I | P | P | I | P | P | I | P | P | I | P | P | I | P | P | I | I | P | P | I | P | P | I | P | P | I | P | P | I | P | P | I |
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB 99/01015

| A. CLASSIFICATION OF SUBJECT MATTER | | |
|---|--|---|
| IPC7: H04N 9/804, H04N 5/783 // H04N 5/7826 According to International Patent Classification (IPC) or to both national classification and IPC | | |
| B. FIELDS SEARCHED | | |
| Minimum documentation searched (classification system followed by classification symbols) | | |
| IPC7: H04N | | |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched | | |
| SE,DK,FI,NO classes as above | | |
| Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) | | |
| C. DOCUMENTS CONSIDERED TO BE RELEVANT | | |
| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| X | WO 9613121 A1 (THOMSON CONSUMER ELECTRONICS, INC.), 2 May 1996 (02.05.96), page 1, line 8 - page 3, line 22; page 4, line 8 - page 5, line 18; page 6, line 9 - page 9, line 28, page 9, line 29 - page 10, line 8 -- | 1-10,13-18, 21-23 |
| A | US 5726711 A (JILL MACDONALD BOYCE), 10 March 1998 (10.03.98), column 8, line 13 - line 31; column 12, line 16 - column 15, line 27 -- | 3-4,11-12, 19-20 |
| A | EP 0613297 A2 (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.), 31 August 1994 (31.08.94), see the whole document -- | 11-12,19-20 |
| <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex. | | |
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| Date of the actual completion of the international search | | Date of mailing of the international search report |
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INTERNATIONAL SEARCH REPORT

International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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| A | US 5717816 A (JILL MACDONALD BOYCE ET AL), 10 February 1998 (10.02.98), column 13, line 14 - line 32; column 14, line 33 - line 51 -- | 11-12,19-20 |
| P,A | WO 9838800 A1 (BRITISH BROADCASTING CORPORATION), 3 Sept 1998 (03.09.98), claims 1,6 -- ----- | 11-12,19-20 |

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB99/01015

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See next page.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB99/01015

WO 9613121 discloses a method of recording digital video information comprising merging means adapted to merge intra encoded pictures extracted from a digital video information signal with empty inter encoded pictures in order to form a trick play signal. WO 9613121 discloses the technical features of the invention as expressed in claims 1-2. These technical features are the only common features between the inventions 1-3 as stated below. Accordingly, claims 3, 6, 7 do not satisfy the requirement of unity of invention.

Invention 1 - Claims 3-5, 13, 21, 23 relate to trick play signals in a digital video information recording apparatus.
The special technical feature of invention 1 is that a second trick play signal for faster reproduction speed can be generated by selecting group of pictures from the first trick play signal.

Invention 2 - Claims 6 relates to the bit cost of the groups of pictures of the trick play signal. The special technical feature of invention 2 is that these groups of pictures are generated with a constant bit cost.

Invention 3 - Claims 7-12, 14-20, 22 relate to compression of the intra encoded pictures of the trick play signal.
The special technical feature of invention 3 is that the intra encoded pictures of the trick play signal are compressed versions of the intra encoded pictures of the digital video information signal.

INTERNATIONAL SEARCH REPORT
Information on patent family members

02/12/99

International application No.
PCT/IB 99/01015

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